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Janet Campbell, Editor

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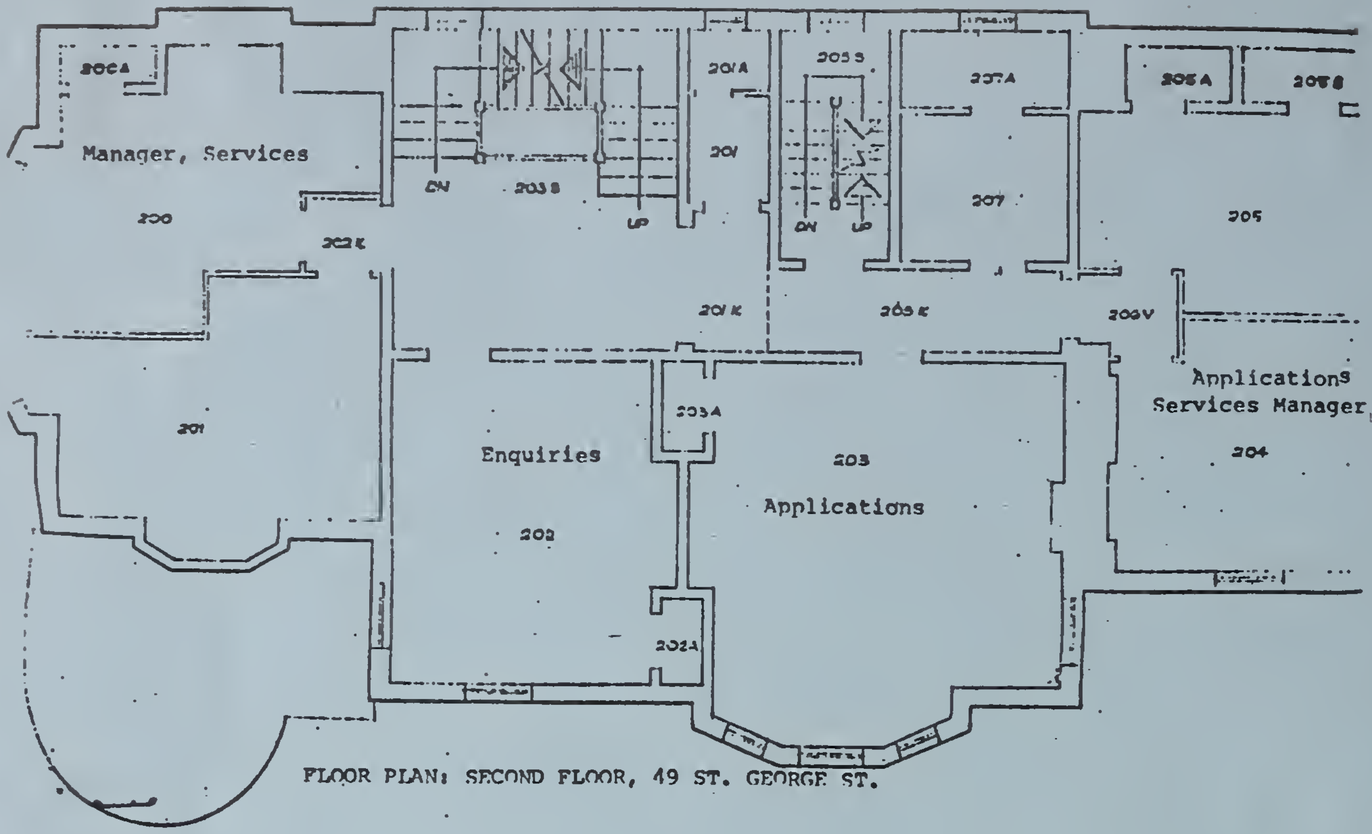

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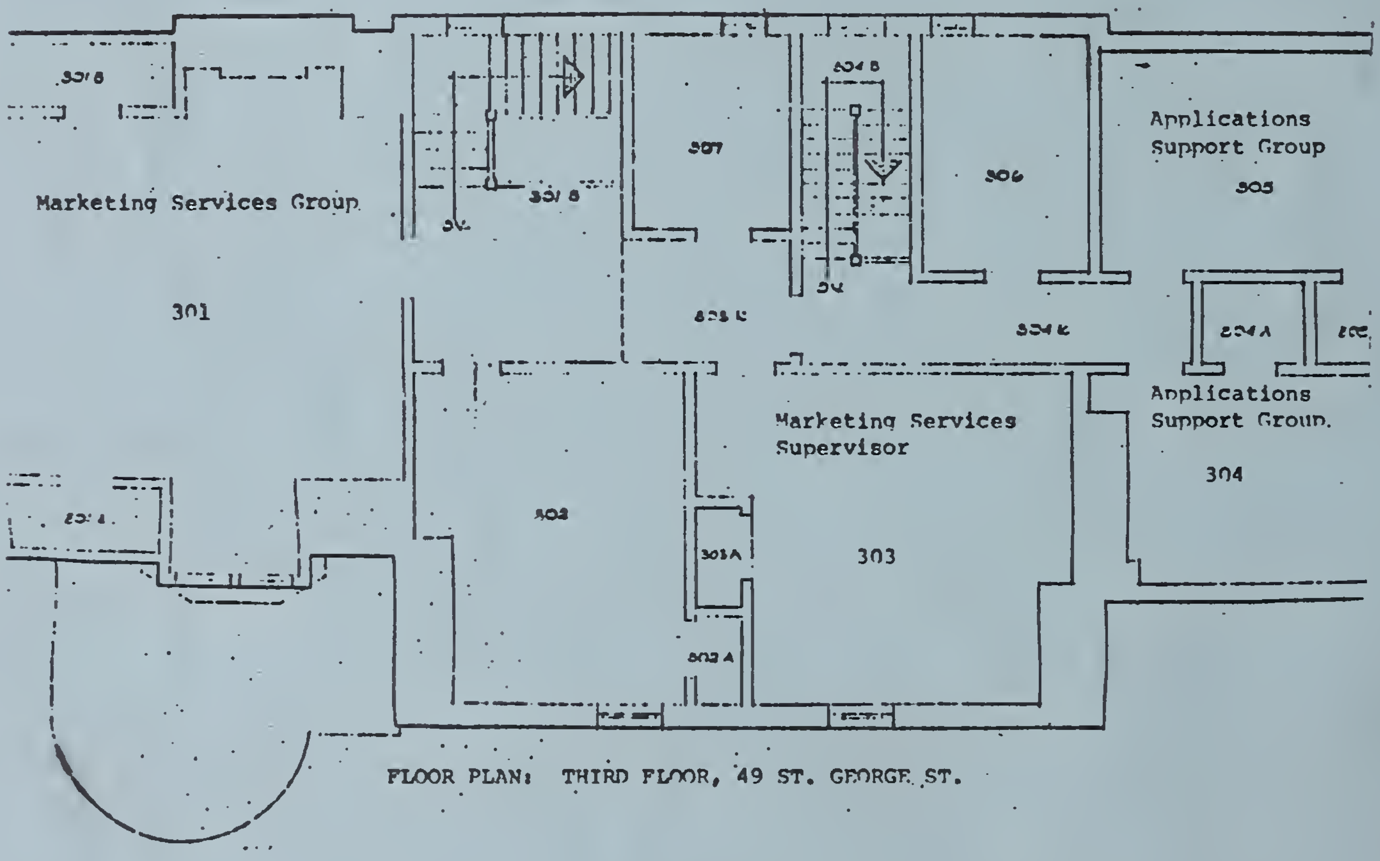

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COMPUTERNEWS is a monthly publication produced by the University of Toronto Computer Centre. Enquiries or contributions should be directed to the Editor, Janet Campbell or the Assistant Editors, Margo Harvie and Ruth Borenstein in the Sandford Fleming Building room SF125 or (416)-928-2066. Layout and ATS typing are provided by Lynne Jenkins. Subscription changes should be directed to the Information Office, Sandford Fleming Building room SF128 or (416)-928-4990.

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COMPUTERNEWS SUBSCRIPTION RENEWAL

All COMPUTERNEWS subscribers are reminded that they must complete a copy of the COMPUTERNEWS ADDRESS FORM and return it to the Information Office, SF128 before Friday, March 21, 1975 if they wish to continue receiving the UTCC newsletter.

A copy of the ADDRESS FORM appears on the back cover of this issue of COMPUTERNEWS. The form is pre-addressed and can be returned free-of-charge via campus mail. Subscription changes will go into effect with the March 1975 issue of COMPUTERNEWS. Subscription enquiries should be directed to June Bridges at 928-4990.

Janet Campbell

ATTENTION ALL USERBOOK SUBSCRIBERS

The revised, modular USERBOOK will be distributed during the first week of March, 1975. Current USERBOOK subscribers are reminded that with the distribution of the revised edition, the old USERBOOK becomes obsolete and no further updates will be issued to subscribers who have failed to return the USERBOOK Order Form mailed to them in January, 1975.

As was outlined in the instructions included with the Order Form, subscribers are asked to follow the procedures listed below upon receipt of the revised USERBOOK:

-- Check to ensure that all modules and Sections you requested are included in your new USERBOOK. Any discrepancies should be reported to the Information Office SF128, 928-4990 or 928-4991.

-- If you have chosen to include Section 2 (Advanced General) and/or Section 4 (Interactive System/360-65 Services) in your new USERBOOK, these Sections must be transferred from your old copy to your new copy.

-- Before assembling your modular USERBOOK, please review the explanation of the USERBOOK numbering system. The numbering system for all Sections or base modules is described on page 1.1040 in Section 1; the numbering system for optional modules is described on page 3.0005-2 in Section 3.

If you have any questions or problems concerning the revised USERBOOK, please contact Don Gibson at 928-5568 or Janet Campbell at 928-2066. Copies of the Order Form are available at the Information Office, SF128, phone 928-4990 or 928-4991.

Janet Campbell

CHANGES TO PHONE LIST

The following changes have been made to the phone list that appeared in last month's issue of COMPUTERNEWS. Numbers listed in last month's article that do not

cont'd...

CHANGES TO THE PHONE LIST Cont'd.

appear here remain the same. The numbers given below are final, and together with the unchanged numbers from last month's listing, constitute a permanent phone list.

NAME	PHONE
Marilyn Hall	4869
Dave Hart	6281
Sean Keeley	6876
Herb Kugel	7286
Jaime Menendez	6133
Len Prepas	6878
John Roth	8701
Dave Scobie	6877
Joyce Walton	6875

Margo Harvie

ADVISORS NEEDED

During the 1975-1976 academic year there will be positions available for both High Speed Job Stream Advisors and General Purpose Job Stream Advisors at the Sandford Fleming Terminal and at the Arts and Science Terminal. Application forms are available from the Terminal Co-ordinators. A summary sheet which describes the qualifications necessary for the jobs, is also available.

Mark Tapia

COURSE -- "APL FOR SCIENTISTS AND ENGINEERS"

Prerequisite:	Familiarity with APL as presented in the IBM APL/360 User's Manual (GH20-0906-1)
Date:	March 24, 26, 28
Time:	3 - 5 p.m.
Maximum # of Registrants:	Enrollment will be limited to the first 25 applicants and is restricted to faculty, graduate students or staff.
Instructor:	Ernst Goetze

The course is intended to assist engineers and scientists in rapidly defining and solving computational problems in the programming language APL. Some aspects of the APL interpreter and 360 arithmetic useful to the scientific programmer will be discussed. This course is problem oriented and in solving several core problems, topics such as function definition and assignment, linear equations and matrix analysis, curve fitting, graphics and format, numerical integration, ordinary differential equations, optimal search methods and the simulation of a stochastic process will be covered.

The course will take place on the St. George campus. A pre-addressed registration form is included as a supplement to this issue of COMPUTERNEWS and may be returned via campus mail free-of-charge. This form, with the room number in which the course will meet, will be returned to you as confirmation of your enrollment.

Don Gibson

AEDS WORKSHOP

The sixth annual AEDS (Association for Educational Data Systems) workshop on the development and evaluation of educational programs in computer science and data processing will be held at the Holiday Inn--North, St. Louis, Missouri on Friday, March 14, 1975. This workshop is recommended for educators and administrators who are developing, planning or evaluating computing courses and curricula for programs not necessarily leading to a bachelor's degree.

The following excerpt from the AEDS WORKSHOP promotional brochure describes the topics which will be discussed:

A staff of educators in the fields of computer science and data processing will discuss course content, curricula and many other aspects of presenting educational programs in computer science that include the areas of programming languages, computing techniques, information structures, business data processing, numerical methods, programming systems, information processing, design of computers, computer aided instruction, time sharing, statistical methods and operations research. The discussions will emphasize both course content and the problems associated with implementing an educational program in computer science. Proposed, new and existing computer science programs will be discussed. An evaluation will be made of courses and degree programs especially designed to prepare teachers of information and computer sciences. The needs of industry will be identified and recommendations will be made on how educational institutions should meet these needs. An attempt will be made to describe the requirements that are not being met and how these requirements can be fulfilled. The similarities and differences between existing academic programs will be evaluated. The placement of the graduate of two-year technical programs in computer science will be considered as well as a future demand for such graduates.

The advance registration fee for the workshop is $40 for AEDS members and $45.00 for others. Closing date for advance registration is March 7. Late registration will be accepted on a space available basis after that date and will be an additional $10.00.

Copies of the registration form are available from the Information Office, SF128.

Janet Campbell

PROFESSIONAL DEVELOPMENT COURSE

Four courses designed for programmers and supervisory personnel will be offered by the Institute of Computer Science in May, 1975 at the University of Guelph. The courses, described below, are open to all faculty and staff of Ontario universities.

cont'd...

DEVELOPMENT COURSE Cont'd.

Database Concepts

Date: May 5 - May 6
Instructor: Mr. H. Uhrbach,
DBD Systems Inc.
Price: $170.00 per person
Who Should Attend:
Data processing management, senior technical personnel in data processing and general management users of data processing.

The seminar is oriented toward those members of Management who require a general understanding of the nature of the data base and Generalized Data Base Management Systems, their impact on the organization, and the definition of an environment in which the data base functions most effectively. Emphasis is placed upon the justification of a data base effort, long range planning for implementation, and ultimate evaluation of performance and effectiveness. The seminar addresses the basic question "Why a Data Base, and what does it mean to the organization?"

Advanced Programming Techniques

Date: May 7 - May 9
Instructor: Mr. C. S. Matheny
Price: $200.00 per person
Who Should Attend:
Programmers, analysts and technical supervisors and managers. Also recommended for those responsible for training and educating programmers.

This course embraces a range of programming skills rarely covered in the basic training offered by hardware suppliers. These "advanced" techniques are applicable to any computer installation in any of the major programming languages. The intention is for participants to leave the course with practical ideas which can be readily applied in their own installations.

Project Management

Date: May 7 - May 9
Instructor: Mr. L. R. Clark
Price: $215.00 per person
Who Should Attend:
Those who concurrently direct the work of programmers, analysts and other software or systems personnel.

Emphasis will be placed on understanding a management-by-objective philosophy and the application of this approach to software functions. The managerial activities of planning, executing, reviewing and developing professional/technical personnel will be included. Many of the concepts of Drucker, McGregor and Herzberg will be applied to form a practical, results-oriented system of programming management. The seminar will not concentrate upon project management techniques.

Innovation and Creativity

Date: open
Instructor: Dr. F. D. Barret,
Management Concepts Ltd.
Price: $150.00 per person

cont'd...

DEVELOPMENT COURSE Cont'd.

Who Should Attend:
Supervisors and Managers who are responsible for planning of services.

This course will teach you how to use your organization's resources of brain power to adapt, innovate and produce new results. It is based on practical work done over the last seven years in a score of leading Canadian and American companies, schools and government departments.

University of Toronto faculty or staff interested in attending any of these courses should contact Stan Yagi, SG202, 928-7331 by Friday, March 7, 1975.

Stan Yagi

THE 6TH ONTARIO UNIVERSITIES COMPUTING CONFERENCE

The 6th Ontario Universities Computing Conference will be held on the 26th, 27th, and 28th of May, 1975, at the University of Western Ontario.

The subject of the Conference will be "Computer Services in the Second Half of the 1970's". The Conference will deal with such topics as present information processing services, future service offerings and management preparation. The Conference should appeal particularly to senior technical staff and managers, directors of computing centres, and computer policy committee members in Canadian universities and colleges.

The Conference Chairman is G. T. Lake, Director of the Computing Centre at the University of Western Ontario. The Conference registration fee will be $50.00.

SHARE PROGRAM LIBRARY

Share Incorporated is a world educational and scientific organization comprised of members from installations with computing systems built around IBM central processing units. A special form of membership is also permitted for organizations supplying products suitable as components of, or adjunct to, "SHARE machines".

The principal purpose of SHARE is to foster the development and exchange of technical information through its project activities, session presentations, meetings, discussion groups, forums, panels, lectures and published literature.

One of the earliest projects to evolve since the first SHARE meeting in August 1955 was the development of a formal program exchange, the SHARE Program Library. The SHARE Program Library is a collection of program packages submitted by the participating SHARE installations, to promote the exchange of technical information, lower software development costs and to help minimize duplication of effort.

The work of receiving, processing and distributing the Library materials is performed by the SHARE Program Library Agency (SPLA), presently located at Triangle Universities Computation Centre (TUCC) in North Carolina.

cont'd...

SHARE PROGRAM LIBRARY Cont'd.

TUCC serves only as the distribution agent for code and documentation contributed in the original and does not test or maintain these programs.

Contributing Programs:

Any SHARE member may submit programs to the Library. The submittor is responsible for providing SPLA with a minimum package consisting of:

-- submittal form (completed by the author)
-- program abstract
-- program writeup
-- source program
-- object program (optional)
-- sample problems

For further information on how to submit a program to the SPLA in accordance with SHARE standards, refer to the "SHARE Reference Manual" in the UTCC Technical Reference Centre, Sir Sandford Fleming Labs., Room 128.

Ordering Programs:

The standard distribution includes one copy of the documentation and one copy of all machine-readable materials provided by the submittor. Normally the distribution will be of the most recent version of the program but older versions can be made available by special arrangements. SPLA will ship only programs in the 360-370D Series, since most the 3000 and 7000 Series programs have now been retired.

A subscription fee to the Library is not required and the price of programs is the same for SHARE and non-SHARE members ($30, North American continent). This charge, to be prepaid, is intended to cover only the distribution expense of a basic program package (600 ft. 9-track tape, up to 20 pages of documentation and airmail postage).

A complete listing of available SHARE programs along with ordering instructions and other services can be found in the UTCC Technical Reference Centre. The TRC also houses a sizeable collection of these programs to meet our users' special needs.

For further information on the SHARE Program Library and SPLA, contact Marg Doherty at 928-8995.

Marg Doherty

STRUCTURED SUBSETS OF PL/I

During the last year, a special PL/I compiler has been in use at the University of Toronto Computer Centre. This compiler supports "structured subsets of PL/I", called SP/k, which have been designed to encourage good programming. The compiler was developed by the Computer Systems Research Group under the direction of Professors Holt and Wortman at the University of Toronto. These subsets of PL/I are compatible with PL/I as supported by the PL/C, PL/I-F, IBM Check Out and IBM Optimizer compilers.

cont'd...

STRUCTURED SUBSETS OF PL/I Cont'd.

Heavy usage: The special compiler for SP/k, called SP/k/360, has had heavy usage. It has been used by introductory computer science courses at the University of Toronto and by several Toronto high schools. During the fall term, 1974, over 50,000 jobs per month were processed by SP/k/360 on the High Speed Job Stream. The compiler has been used under MVT, VS/2 and DOS.

Highly Reliable: The SP/k/360 compiler is one of the most reliable compilers used at UTCC. It has no known bugs.

Highly Diagnostic: The SP/k/360 compiler accepts student programming errors gracefully. It repairs lines containing syntax errors and displays the repaired source line. The treatment of errors by SP/k seems to be as good as any other compiler at UTCC.

Small Region: It is possible to run SP/k/360 in a very small region. A tailored version for DOS/360 runs in about 90K bytes. It would be possible to run SP/k/360 in less than 50K bytes if necessary.

The Subsets: The SP/k subsets are called SP/1, SP/2, SP/3 and so on. Each successive subset introduces new programming language features while keeping the features of the previous subsets. Briefly, the subsets are as follows.

SP/1 - Output(PUT LIST) and expressions
SP/2 - Variables, input and assignment
SP/3 - Selection and repetition (IF and DO)
SP/4 - Character strings
SP/5 - Arrays
SP/6 - Procedures (subroutines and functions)
SP/7 - Formatted input/output
SP/8 - Record input/output and PL/I structures

At present, SP/k/360 supports the first six subsets. Complete specifications for these six subsets are available as the module entitled 3.6HSSPK of the UTCC USERBOOK.

SP/k vs. PL/C: Programs written in the SP/k subsets can be run under PL/C. The SP/k/360 compiler purposely supports less features of PL/I than does PL/C. For example, SP/k/360 does not support GO TO, ON units and explicit precisions because these features tend to lead to confusing programs. Many teachers feel that the restrictions imposed by SP/k/360 make it easier to teach structured programming. The SP/k/360 compiler has the advantage that it automatically paragraphs (indents) student's programs. The SP/k/360 compiler supports special mark sense cards, as well as punched cards, for schools in which keypunches are not available.

cont'd...

STRUCTURED SUBSETS OF PL/I Cont'd.

PDP-11 compiler for SP/k: Another compiler for SP/k, called SP/k/11, runs SP/k jobs on the Digital Equipment PDP-11 minicomputer, with disk, printer and reader. SP/k/11 is functionally equivalent to SP/k/360. In fact, they are really the same compiler, written in a high level language called SUE. Basically, SP/k/11 is SP/k/360 recompiled with the generation of PDP-11 machine code instead of 360 machine code. (Actually it is not quite that easy). A PDP-11 running SP/k is scheduled to be installed by March in a Toronto high school.

A textbook for SP/k: Professors Hume and Holt of the Department of Computer Science are completing a text called Structured Programming - Using Subsets of PL/I called SP/k. This text is being published by Reston, a Prentice-Hall subsidiary and is supposed to be available for Fall 1975 classes. The text could be used with SP/k/360, SP/k/11, PL/C or any other compiler supporting at least the SP/k subsets of PL/I.

Distribution of the SP/k Compilers: Versions of the SP/k compilers for OS/360, DOS/360 and the PDP-11 are to be available for distribution for use in Fall 1975 classes. For details, write SP/k Distribution, Computer Systems Research Group, Room 216, Sir Sandford Fleming Lab., University of Toronto, Toronto, Canada, M5S 1A1.

Richard Holt and David Wortman

PERSONNEL CHANGES

Leaving the Centre this month is Gerry Sauer who is transferring within the University to the Information Systems Department. Also leaving this month is Barbara Ablett of the Administration Group. Good luck in your new endeavours.

February brings us five new employees; Alfred Schall, Di-Anne Madill, Bassey Akpan and Agnes Obeng. Alfred is a computer operator at 7094, Di-Anne is the secretary for Applications Support and Services, Bassey and Agnes are data entry operators in the Applications Support area. I hope you will find your work here satisfying and enjoyable.

Trudy Holland

RECENT ACQUISITIONS IN THE DEPARTMENT OF COMPUTER SCIENCE LIBRARY

Dahlquist, Germund and Björck, A.
Numerical methods.
Englewood Cliffs, N.J., Prentice-Hall, 1974.

Forrester, Jay W.
Urban dynamics.
Cambridge, Mass., M.I.T. Press, 1969.

Friedman, Daniel P.
The little LISPer.
Chicago, Science Research Assoc., 1974.

cont'd...

RECENT ACQUISITIONS Cont'd.

Jerusalem Conference on Information
Technology, 2d, 1974.
    Computers for social and economic
    development. Conference
    proceedings, v.1, ed. by C.C.
    Gotlieb and H. Maisel.
Jerusalem, ILTAM, 1974.

Katzan, Harry.
    Computer data security.
New York, Van Nostrand Reinhold, 1973.

Pollack, Seymour V. and Sterling, T.D.
    Essentials of PL/I.
New York, Holt, Rinehart and Winston,
1974.

Turn, Rein.
    Computers in the 1980s.
New York, Columbia University Press,
1974.

Schriber, Thomas J.
    Simulation using GPSS.
New York, Wiley, 1974.

FORTRAN LIBRARY UPGRADE

The System default FORTRAN Program Product library SYS1.FORTLIB was upgraded on February 17, 1975. PTF16 and a few other fixes have been included in the modification. The upgrade will correct, among other things, the predominant 0C4 ABENDS at return in VS.

Users who have questions or problems should contact Kin Fong at 928-4924.

Kin Fong

RANDOM NUMBER GENERATORS

The following copy of a memo from David Andrews and the relevant computer output, may be of interest to statistical analysis users.

David Andrews writes:

"Although RANDU, the SSP random number generator, has not been well received in the statistical community, many users feel that it is "adequate for the present purposes". Such users may be interested in calculating

$$9u_n - 6u_{n+1} + u_{n+2}$$

for any sequence of 3 RANDU numbers. Ideally the results should be dense in the region -6 to 10. In fact, the result turns out to be an integer! (Try it). This is particularly disastrous for particle scientists (and others) who use random numbers in sets of three to give position, velocity and momentum coordinates.

Users who find these results disquieting may be interested in a vastly superior generator described by Lewis et al, IBM Sys. J. 8 (1969) 136-46."

Dave Andrews' FORTRAN program and its output using the routine RANDU appear below.

```
$JOBW                    9999999
         DIMENSION U(101),X(33)
         IX=3747
         DO 1 I=1,101
         CALL RANDU(IX,IY,YPL)
         IX=IY
   1     U(I)=YPL
         DO 2 I=1,3
         K=1
         DO 3 J=I,99,3
         X(K)=U(J)*9.0-U(J+1)*6.0+U(J+2)
   3     K=K+1
         KK=K-1
         CALL SORT(X,KK)
         WRITE(6,100) I
         WRITE(6,101) X
   2     CONTINUE
 100     FORMAT(' ','SET',2X,I2,/)
 101     FORMAT(' ',10(F10.5,1X))
         STOP
         END

         SUBROUTINE RANDU(IX,IY,YPL)
         IY=IX*65539
         IF(IY) 5,6,6
   5     IY=IY+2147483647+1
   6     YPL=IY
         YPL=YPL*.4656613E-9
         RETURN
         END

         SUBROUTINE SORT (V1,N)
         REAL V1(N)
C  SHELL SORT ALGORITHM CACM JULY 1964
         I=1
   1     I=I+I
         IF(I.LE.N) GO TO 1
         M=I-1
   2     M=M/2
         IF(M.EQ.0) RETURN
         K=N-M
         DO 4 J=1,K
         L=J
   5     IF(L.LT.1) GO TO 4
         IF(V1(L+M).GE.V1(L)) GO TO 4
         X=V1(L+M)
         V1(L+M)=V1(L)
         V1(L)=X
         L=L-M
         GO TO 5
   4     CONTINUE
         GO TO 2
         END
```

**

```
SET  1

   -5.00000   -4.00000   -3.00000   -3.00000   -3.00000   -2.00000   -2.00000   -2.00000   -1.00000   -0.00000
   -0.00000    0.00000    0.00000    1.00000    1.00000    1.00000    1.00000    1.00000    1.00000    2.00000
    2.00000    2.00000    3.00000    3.00000    3.00000    4.00000    4.00000    5.00000    5.00000    6.00000
    6.00000    8.00000    8.00000
SET  2

   -4.00000   -4.00000   -3.00000   -3.00000   -2.00000   -1.00000   -1.00000   -1.00000    0.00000    1.00000
    1.00000    1.00000    1.00000    1.00000    1.00000    2.00000    3.00000    4.00000    4.00000    4.00000
    5.00000    5.00000    5.00000    5.00000    6.00000    6.00000    7.00000    7.00000    7.00000    7.00000
    8.00000    8.00000    9.00000
SET  3

   -3.00000   -3.00000   -2.00000   -2.00000   -2.00000   -2.00000   -2.00000   -2.00000   -1.00000   -1.00000
   -1.00000   -1.00000   -1.00000   -0.00000   -0.00000    0.00000    1.00000    2.00000    2.00000    3.00000
    3.00000    3.00000    3.00000    4.00000    4.00000    4.00000    5.00000    5.00000    6.00000    6.00000
    6.00000    7.00000    7.00000
```

** The three sets of numbers shown above are the results obtained by first generating 101 random numbers using the subroutine RANDU, then forming the expression $9U_n-6U_{n+1}+U_{n+2}$ for any sequence of 3 RANDU generated numbers, and finally partitioning the resulting numbers into 3 sets of numbers, ordering them into ascending sequence of magnitude.

RANDOM NUMBER Cont'd.

UTCC has more than one random number generating routine available in online S/370 libraries. Among them are RANDU2 (modified SSP routine RANDU), GAUSS2 (modified SSP routine GAUSS) and four routines from the IMSL package of programs, GGU1, GGU2, GGNRF and GGNOR.

Documentation itemizing these routines and explaining how to access them, can be found in the USERBOOK modules entitled 3.7STATNDEX, 3.7SSPSTAT, and 3.7IMSL. The statistical routines of the IMSL package also include other random number generators that might be of interest.

Dave Andrews' short FORTRAN program modified by a call to the routine GGNRF has been used to generate the set of random numbers below. The random numbers so generated are non-integer and dense in the range -6 to 10.

Len Prepas

```
LEASE 2.0                 MAIN

      DIMENSION U(101),X(33)
      CALL  GGNRF(101,U)
      DO 2 I=1,3
      K=1
      DO 3 J=I,99,3
      X(K)=U(J)*9.0-U(J+1)*6.0+U(J+2)
    3 K=K+1
      KK=K-1
      CALL SORT(X,KK)
      WRITE(6,100) I
      WRITE(6,101) X
    2 CONTINUE
  100 FORMAT(' ','SET',2X,I2,/)
  101 FORMAT(' ',10(F10.5,1X))
      STOP
      END
LEASE 2.0                 SORT

      SUBROUTINE SORT(V1,N)
      REAL V1(N)
      I=1
    1 I=I+I
      IF(I.LE.N) GO TO 1
      M=I-1
    2 M=M/2
      IF(M.EQ.0) RETURN
      K=N-M
      DO 4 J=1,K
      L=J
    5 IF(L.LT.1) GO TO 4
      IF(V1(L+M).GE.V1(L)) GO TO 4
      X=V1(L+M)
      V1(L+M)=V1(L)
      V1(L)=X
      L=L-M
      GO TO 5
    4 CONTINUE
      GO TO 2
      END
```

RANDOM NUMBER Cont'd.

***

```
SET    1

 -17.64268  -16.32945  -16.25209  -14.50187  -12.03217  -10.96055   -9.71432   -8.83580   -6.67096   -6.25792
  -6.09585   -5.14921   -4.90559   -4.32726   -3.85678   -3.65761   -1.18186   -0.87239   -0.53700   -0.10861
   0.47441    1.37530    3.98478    4.75960    7.27312    9.29529   10.03870   10.14417   10.56654   10.73240
  15.77248   20.58757   31.20705
SET    2

 -27.83832  -16.44933  -15.21770  -14.50791  -10.99269  -10.89517  -10.12960   -9.99310   -9.95260   -7.06393
  -6.51101   -6.12872   -5.92955   -5.44634   -4.55865   -0.54193    0.65885    1.63938    3.18212    3.45386
   3.54497    3.63334    4.24192    5.11749    5.12604    5.99901    6.85139    7.41457    7.51283    7.89778
   9.45617    9.62186   28.64012
SET    3

 -20.65623  -19.65768  -16.96478  -11.57458  -11.18945   -9.64467   -8.55161   -7.20795   -6.25863   -5.59440
  -5.11083   -4.19598   -3.65349   -1.69324   -1.46948   -1.38365    0.54435    1.84136    3.14363    3.23862
   5.55582    6.07292    6.35927    6.70485    8.58720    9.10482   11.65991   11.97337   12.47180   13.25540
  17.11548   17.17536   18.04372
```

*** The program used to generate the results shown above differs from Dave Andrews' program only in the area of the calling sequence to GGNRF (in place of RANDU). One call to GGNRF replaces 101 calls to RANDU.

DEBUGGING ASSEMBLY LANGUAGE PROGRAMS

Assembly language coding is not the most popular of source languages because of its complexity of usage. There are, however, certain types of programs that lend themselves quite well to assembly language usage. In fact, there are some applications that can only be done in assembly language, e.g. problems in which a specific number of instructions must be completed within a certain 'real time'. UTCC has recently seen several hard-to-debug assembly language programs and this article outlines some basic programming techniques which may assist the user in debugging such programs.

A tremendous aid in assembly language coding is standardization within the various modules. The user must be aware of the following standard OS register usage:

Register 13 holds the address of the save area.

Register 14 holds the address of the return point in the calling program.

Register 15 holds the entry point address of the called program.

Register 1 contains the address of the parameter list (i.e. arguments to be passed to the called program).

In addition, the user should standardize within his modules. If Register 12 is assigned the base address value, and Register 11 the internal transfer register, the following series of calls could result:

```
MAIN
            BAL  11,RTN1
            BAL  11,RTN2
                  .
                  .
                  .
            BAL  11,RTNi
```

And each Routine, RTNi, could be of the form:

```
            STM  (14,12),,*
            BALR  12,0
            USING *,12

            BR   11
```

If Registers 11 and 12 are not defined for any other purpose, and the program abends, the routine in which the program died (contents of Register 12), and the routine which called it (contents of Register 11) may be traced.

A user can, for example, determine how far in a particular routine he is by coding:

```
LA  10,*
```

When the module abends, Register 10 will contain the address of the last instruction executed in the module. This is extremely useful, particularly if the Program Status Word (PSW) has been clobbered.

cont'd...

DEBUGGING ASM Cont'd.

A further debugging tool is the Write-To-Operator (WTO) MACRO Instruction. This routine is used to enter messages in the system log, as well as to display information for the operator. The output from each such 'WTO' that is issued is also included in the user's output in the 'HASP SYSTEM LOG' section and is thus available for inspection by the user. Care should be taken not to call this routine too often (as in a heavy loop), as it will clutter up the operator's screen. It can be used in the following form:

```
WTO        'NOW AT POINT A'

WTO        'NOW AT POINT B'
```

The WTO Routine as used here acts as a 'sign on' for specific blocks of instructions and, as such, is a further aid in debugging.

If you have any questions concerning this article, contact Herb Kugel at 928-7286.

Herb Kugel

IEHMOVE DANGERS

The utility IEHMOVE is used to create backup or unloaded versions of partitioned dataset libraries on magnetic tape. Examples of its use can be found in the USERBOOK module entitled 3.4UTILS.

When using this utility it is essential to choose the correct option. Otherwise, serious programming problems or the loss of datasets can result. For example, if the MOVE option is used rather than the COPY option, the dataset being moved will be scratched even if the programmer specified DISP=(OLD,KEEP) on his JCL.

It should also be noted that a backup tape of multiple files can be destroyed if the user forgets to specify the file number of the file being moved or copied in the IEHMOVE control statements. Simple JCL here is not enough. The IEHMOVE control statements must be correct also.

Users who are planning to use the utility IEHMOVE should study the examples given in the USERBOOK module 3.4UTILS and refer to the section on IEHMOVE in the IBM Utilities manual, OS UTILITIES GC28-6586-15. The dataset you save will be your own!

Any questions should be directed to Herb Kugel, at 928-7286.

Herb Kugel

FORTRAN PROGRAMMING ARTICLES AVAILABLE

Three excellent articles are available which provide useful tips on optimizing FORTRAN programs and on the art of writing 'readable' FORTRAN programs.

cont'd...

FORTRAN PROGRAMMING ARTICLES Cont'd.

The first article, How to Write a Readable FORTRAN Program by Daniel D. McCracken and Gerald M. Weinberg, originally appeared in the October 1972 issue of DATAMATION. It deals with the use of comments, GO TO statements, DO loops, the use of parentheses and many other items used in FORTRAN. The emphasis in this article is on producing a self-documenting program.

The second article, The Efficient Use of FORTRAN by Chris Larson originally appeared in the August 1971 issue of DATAMATION. It deals with input/output statements, dimension statements, subscript usage, datatypes and conversions and external programs and subprograms.

The third article, Optimization with FORTRAN H, by C. Vogt appeared in the University of Waterloo Computer Centre Newsletter of June, 1971. It deals mainly with various instream coding techniques that could save both time and core (memory).

Xerox copies of these three articles are available from the Information Office, SF128. Users who are involved in FORTRAN applications and wish to discuss debugging or optimizing FORTRAN programs are invited to contact Herb Kugel at 928-7286.

Herb Kugel

HIGH SPEED JOB STREAM NEWS

No charts or graphs are available this month. During the changeover from MVT to VS, the format of the database used to produce these reports was changed. Since part of the data for the month was collected under MVT and part under VS, we are unable to include these statistics.

Mark Tapia

S/370-165-II RELIABILITY

The reliability statistics for January indicate an uptime percentage of 95.7 while the average number of IPLs per day reached 2.77. The scheduled hours of production for January totalled 473. VS2R2 was installed on December 30, 1974 and withdrawn on January 25, 1975 due to severe performance problems. This accounts for the greater part of the high downtime figure for January.

cont'd...

S/370-165-II RELIABILITY Cont'd.

MONTHLY COMPARATIVE FIGURES

MONTH	% UPTIME	UNSCHED. IPLs/DAY
JAN/74	97.0	1.37
FEB/74	98.3	1.25
MAR/74	98.7	1.06
APR/74	99.3	0.52
MAY/74	99.2	0.87
JUN/74	96.1	0.75
JUL/74	91.7	1.66
AUG/74	98.3	0.86
SEP/74	94.5	1.83
OCT/74	98.6	1.07
NOV/74	98.9	0.93
DEC/74	97.1	1.21
JAN/75	95.7	2.77

The percentage breakdown of total system downtime for January was:

Hardware: 490 minutes (40.4%)
Software: 571 minutes (47.0%)
Other : 153 minutes (12.6%)

The major events contributing to these downtime totals were as follows:

Jan. 2, 3, 6, 13, 23:

A total of 212 minutes and 19 IPLs were attributed to JES2 Catastrophic errors. A large proportion of these errors were caused by a lack of SQS and a number of user jobs which would fill the JES2 spool volume.

Jan. 13:

A total of 120 minutes and 1 IPL were attributed to a tripped circuit breaker in the main console. A power supply was replaced by IBM in the 3066.

Jan. 21

A total of 285 minutes and 1 IPL were attributed to a system loop on the 3704 control unit. A major part of the downtime was required by IBM to trace the source of the problem through the suspected channel.

Paul Scarborough

```
                            DOWNTIME_REPORT_ON___S/370__FOR_JAN_75


-------------------------------------------------------------------------------------------------------------------------------
|                                                  REIPLS(FREQ) // DOWNTIME (MN)                                               |
|  DAY  REIPL   DNTIME 0    5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95  100|
=======================+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+|
| W  1 (CENTER CLOSED) |                                                                                                    |
| T  2     10     121  |□□□□□□□□□□************************************************************************************* 121 |
| F  3      4      35  |□□□□*******************************                                                                 |
| S  4      1      10  |□*********                                                                                          |
| S  5      0       0  |                                                                                                    |
| M  6      9      91  |□□□□□□□□□**********************************************************************************         |
| T  7      4      22  |□□□□******************                                                                              |
| W  8      2      17  |□□***************                                                                                   |
| T  9      5      50  |□□□□□*********************************************                                                  |
| F 10      6      45  |□□□□□□***************************************                                                       |
| S 11      0      10  |**********                                                                                          |
| S 12      1       7  |□******                                                                                             |
| M 13      3     203  |□□□******************************************************************************************** 203 |
| T 14      4      29  |□□□□*************************                                                                       |
| W 15      1       5  |□****                                                                                               |
| T 16      6      34  |□□□□□□****************************                                                                  |
| F 17      4      22  |□□□□******************                                                                              |
| S 18      2      15  |□□*************                                                                                     |
| S 19      1       5  |□****                                                                                               |
| M 20      1      15  |□**************                                                                                     |
| T 21      3     300  |□□□******************************************************************************************** 300 |
| W 22      1       9  |□********                                                                                           |
| T 23      6      75  |□□□□□□*********************************************************************                         |
| F 24      2      15  |□□*************                                                                                     |
| S 25      1      13  |□************                                                                                       |
| S 26      0       0  |                                                                                                    |
| M 27      0       0  |                                                                                                    |
| T 28      3      38  |□□□***********************************                                                              |
| W 29      3      25  |□□□**********************                                                                           |
| T 30      0       3  |***                                                                                                 |
| F 31      0       0  |                                                                                                    |
-------------------------------------------------------------------------------------------------------------------------------


   LEGEND      : ONE □  =ONE REIPL
                 ONE *  =ONE MINUTE OF DOWNTIME
```

```
                              _S/370__DOWNTIMES_DURING_JAN_75


-----------------------------------------------------------------------------------------------------------------------------
|                                                   TIME OF DAY (HOURS)                                                     |
|  DAY    RELOADS  DNTIME  0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24|
===========================+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+|
| W  1  (CENTER CLOSED)    |                                                                                                |
| T  2      10      121    |          I S  S  S                      S   SS S       S             SS    S     S             |
| F  3       4       35    |    I S  S                                  S                     S                             |
| S  4       1       10    |                                          H                                                     |
| S  5       0        0    |                                                                                                |
| M  6       9       91    |                                      SS     S       H    HS     S   S S                        |
| T  7       4       22    |                   S            O                S          S                                   |
| W  8       2       17    |    I                                       S              S                                    |
| T  9       5       50    |    I                                       S     O   O       S        S                        |
| F 10       6       45    |                                     S      S  S            S O                  S              |
| S 11       0       10    |                                        I                                                       |
| S 12       1        7    |                                           S                                                    |
| M 13       3      203    |    SS                          II                   S S  S  HHHHHHHH                           |
| T 14       4       29    |                S                     S       S S                                               |
| W 15       1        5    |                                                                             S                  |
| T 16       6       34    |    I       S  H                 HH  H                                             S            |
| F 17       4       22    |      O             O                                          S  O                             |
| S 18       2       15    |                                        H                                                       |
| S 19       1        5    |                                                                   S                            |
| M 20       1       15    |                                 I  S                                                           |
| T 21       3      300    |     HHHHHHHHHHHHHHHHHHH                    S                 S                      H          |
| W 22       1        9    |    I                                                S                                          |
| T 23       6       75    |         O                      HH                          SSS               O                 |
| F 24       2       15    |         S                           S                                                          |
| S 25       1       13    |                                                    S                                           |
| S 26       0        0    |                                                                                                |
| M 27       0        0    |                                                                                                |
| T 28       3       38    |                                I       O     S  S                                              |
| W 29       3       25    |                                    SS                         S                                |
| T 30       0        3    |                                I                                                               |
| F 31       0        0    |                                                                                                |
-----------------------------------------------------------------------------------------------------------------------------
LEGEND :     H FOR HARDWARE
             S FOR SOFTWARE                         STATISTICS
             O FOR OPERATIONAL
             U FOR UNEXPLAINED
             I FOR LATE IPL

                                                 TOTAL SCHEDULED HOURS OF PRODUCTION :  473
                                                 TOTAL DOWNTIME (MN)  : 1214 , AVG/DAY :  40.47 , AVG/PROD HOUR :   1.28
                                                 TOTAL REIPL'S        :   83 , AVG/DAY :   2.77
                                                 DOWNTIME RATE IS     :  4.27 PERCENT OF SCHEDULED PRODUCTION HOURS
```

INTERACTIVE SYSTEMS RELIABILITY

The uptimes achieved for the month of January for each of APL, ATS, and CPS were 98.45%, 98.90% and 98.79% of scheduled operation, respectively. The number of scheduled hours of operation during the month of January totalled 493, while the number of unscheduled IPL's per day was 0.29. In addition to the scheduled time, APL, ATS and CPS were also available for approximately 141 hours of unattended weekend operation. The major events contributing to downtime were as follows:

Jan 9:	APL File Subsystem accepted user request before system initialization was complete. The user parameter overlayed the perfile TIFI entry, later causing it to be zeroed.
Jan 10:	IBM maintenance was scheduled at 12:30 to replace defective temperature controller in order to correct intermittant storage protect errors.
Jan 13,14,16:	Some interface problems caused CPU to enter solid system state. The problem was finally resolved on January 17 by replacing a suspected card in 3705 which controls tag and I/O operations.
Jan 26:	On Sunday, a late start was caused by an operating oversight, resulting in 70, 80 and 85 minutes delay in scheduled time for APL, ATS and CPS, respectively.

The following table summarizes the time lost out of scheduled hours of production due to system failures for each of the systems. Nine unscheduled IPL's were required as a result of the failures.

Kam Jain

DATE	DOWNTIME (mins)			REASON
	APL	ATS	CPS	
Thu. Jan. 2	26	17	21	*APL slowdown (SOFTWARE)
"	19	20	22	*PGM check IGF004 (HARDWARE)
Fri. Jan. 3	-	23	20	HASP test version for WORKSTATION testing
Thu. Jan. 9	145	-	-	File Subsystem (SOFTWARE)
Fri. Jan. 10	5	-	-	Data Checks ITS037
"	42	44	45	*Storage protect errors (HARDWARE)
Mon. Jan. 13	15	17	19	*Solid system (HARDWARE)
"	28	40	43	*Solid system (HARDWARE)
Tue. Jan. 14	5	-	-	APL abend SOF3 (HARDWARE)
"	15	17	19	*Solid system (HARDWARE)
Wed. Jan. 15	7	-	-	APL abend SOF3 (HARDWARE)
Thu. Jan. 16	28	30	31	*Solid system (HARDWARE)
Sun. Jan. 26	75	80	85	*Operating oversight (OPERATIONAL)
Wed. Jan. 29	3	5	7	Late IPL due to IBM maintenance
"	13	-	-	Clock set 1 hour ahead at IPL time (OPERATIONAL)
"	30	32	34	*APL slowdown probably caused by previous problem
Total	456	325	356	*IPL Required

System Failures January 1 to January 31, 1975

"STATE OF THE ART IN COMPUTER TECHNOLOGY" SEMINAR

The Digital Equipment Corporation of Canada (DEC) will be presenting a seminar on the "state of the art in computer technology" on Thursday, March 6th at 2 p.m. in the Galbraith building, room 248.

The seminar will be given by Mr. Bill Demmer, Manager of the Medium Systems division of DEC and by Dr. David Nelson of the Systems Architecture and Design division of DEC. The topics which will be covered include:

- Micro Processors and Computers on a board
- Cache memory - design philosophy of the PDP-11/70
- Writeable Control Store and distributed processing in computer networks

This seminar should be of major interest to all minicomputer users at the University of Toronto and to those interested in current minicomputer technology.

Dennis Smith

APL FOR SCIENTISTS AND ENGINEERS

Ernst Goetze will be presenting an APL course for engineers and scientists on March 24, 26 and 28. For further information on this course, see the General News section in this issue of COMPUTERNEWS.

Don Gibson

DIALOGUE: DATATALK QUICK QUERIES

Each month, the University of Toronto DATATALK features dialogues drawn from actual and simulated DATATALK conversational computing experiences.

We hope that these examples will encourage users to find new and better ways in which to use DATATALK services.

DATATALK: Good morning, DATATALK services, Ernst Goetze speaking.
C: Hello...What is the average of 8.8, 11.87, 7.8, 11.47, 8.87, 12.53, 8.6, 12.47, 7.93, 11.93, 8.27, 12.0, 8.47, 11.33, 8.93?
D: 10.08
C: The standard deviation?
D: 1.85
C: What is the range?
D: 4.73
C: How many standard deviations is that?
D: 2.6
C: Ah...How many standard deviations is the largest deviation?
D: 1.3
C: Is there a significant difference from the mean 10.5?
D: The T-value on 14 degrees of freedom is 0.870.
C: Is that significant?
D: No, not at the 5 per cent level.
C: Well, OK...Thank you...Ah, by the way, one other thing, how many of the observations are in excess of the mean?
D: 8

....

DIALOGUES Cont'd.

DATATALK: Good morning, DATATALK services...

C: What are the roots of the polynomial, zero equals 0.85 plus 192.25 X plus 4.48 X-squared plus 7.63 X-cubed plus X to the fourth?

(0 = 0.85 + 192.25 X + 4.48 X*2 + 7.63 X*3 + X*4)

D: There are two real roots and a pair of conjugate complex roots. The real roots are 9.3492 and -0.0044218. Also, the complex roots are 0.86183 + i4.44518 and the conjugate of that.

C: How accurate are those?

D: I don't really know...however, if I evaluate the polynomial on the two real roots in double-precision arithmetic, I get...about 10*-11 and 10*-14, respectively.

D: Moreover, if I evaluate the polynomial on the complex root, I get a complex number with real part about 10*-13 and imaginary part about 10*-12!

C: Oh, well!...That's fine. Thank you very much.

....

DATATALK: Good morning, DATATALK services....

C: Good morning...What is the integral of arctan X plus one half minus arctan X minus one half, between minus one and one?

$$\left(\int_{-1}^{1} \mathrm{ARCTAN}(X+0.5)-\mathrm{ARCTAN}(X-0.5)DX \right)$$

D: Gauss quadrature on 12 and 24 points agree that the value of the integral is 1.529222.

....

DATATALK: Good morning, DATATALK services...

C: One other thing...Glad I got back to you right away...What is the maximum value of that function?

D: It occurs at X=0.0 and is 0.927295.

....

cont'd...

DIALOGUES Cont'd.

DATATALK: Good morning, DATATALK services...
C: Hi! Is there a solution to the equations

$$
\begin{aligned}
0.6\,X1 + 0.3\,X2 + 1.2\,X3 &= 2.97\\
1.0\,X1 + 1.0\,X2 + 3.0\,X3 &= 7.0\\
1.2\,X1 + 1.5\,X2 + 4.2\,X3 &= 9.63
\end{aligned}
$$

D: Yes, there is...X1=5.9, X2=10.1 and X3=-3.0
C: Is that the only solution?
D: No...The rank is two...in which case it is suprising that there is a solution in the first place. However, since there is...there are actually infinitely many other solutions.

....

DATATALK: Good morning, DATATALK services...
C: Hello...Where is the function X to the X plus 1 minus X minus 1 equal to zero?

(0=(X*X+1)-(X+1))

D: At the point X equals 1.441375

Registration for "APL for Scientists and Engineers" Course

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UTCC COMPUTER EQUIPMENT

SYSTEM/370 MODEL 165-II

- located in SF103/105/112
- provides General Purpose Job Stream, High Speed Job Stream and TSO services
- 3072K bytes of memory
- 1 drum
- 13 disk drives (3330)
- 8 disk drives (2314)
- 6 magnetic tape drives (4 9-track and 2 7-track)
- 6 display consoles
- 6 printers
- 5 card readers
- 1 card punch
- 8 remote batch terminals
- 1 paper tape reader
- Calcomp plotters (11" and 30")
- Gould plotter (11")
- OS/MVT with HASP

SYSTEM/360 MODEL 65

- located in McLennan Physical Laboratories
- provides Interactive Systems Service
- 1536K bytes of core
- 24 disk drives (2314)
- 3 9-track magnetic tape drives
- 1 printer
- 1 card reader
- 1 card punch
- 140 typewriter terminals
- OS/MVT with APL, ATS and CPS

7094 II

- located in Room 1203 Burton Tower
- 32K words of core
- 1 disk
- 8 magnetic tape drives
- input/output via a 1401 computer

COMPUTER RESEARCH FACILITY

- located in SF207
- DEC GT44 Systems with
  - 1 PDP-11/40 CPU
  - 2 9-track dual density tape drives
  - 1 1000 cpm card reader
  - VT17 graphics display unit
  - 1 lab. peripheral system with A/D & D/A
- DEC GT40 System with
  - 1 PDP-11/10 CPU
  - 1 2314 tape disk drive
  - 1 VT12 graphic display unit
  - 9-track/800 BPI tape drive
  - 1 Calcomp microfilm plotter
- 2 digitizing tablets
- 1 2701 data adapter with RADDTS

UTCC DIRECTORY

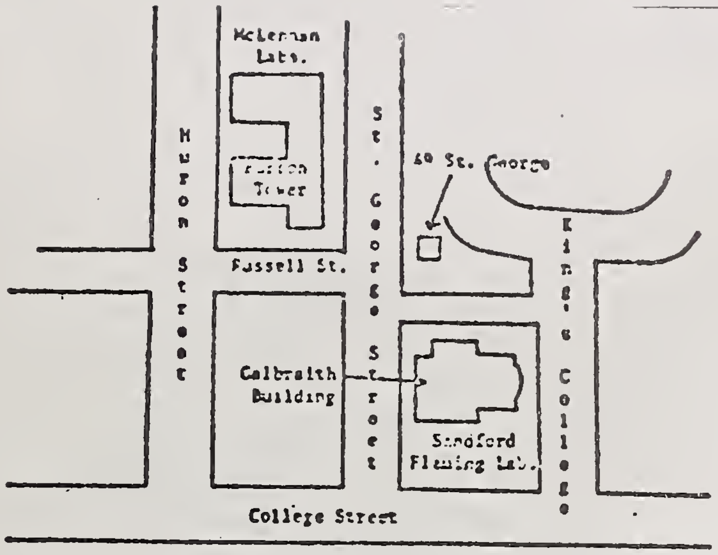
	ROOM	PHONE 928-
DIRECTOR		
John C. Wilson	SF143	6496
ASSOCIATE DIRECTOR		
Al Heyworth	SF116	4936
ADMINISTRATION MANAGER		
Anthony Pieterse	SF137	8948
INFORMATION OFFICE		
General Inquiries	SF128	4990 or 4991
Don Gibson	SF128A	
MANAGER, SERVICES		
Stan Yagi	49 St.Geo	7331
SUPERVISOR, MARKETING SERVICES		
Dave Scobie	49 St.Geo	6877
TERMINAL CO-ORDINATORS		
Sandford Fleming Terminal		
Mark Tapia	SF125	7109
Program Advisors	SF117	8599
Erindale		
Vaughan Lawrason		828-5311
Scarborough		
Ralph Lombardi		284-3173
Arts and Science		
Marlene Domoney	SS2104	6509
Management Studies		
Paul Roth		4917
MANAGER, SUPPORT SERVICES		
Joyce Walton	49 St.Geo	6875
MANAGER, OPERATIONS		
Derry Cox	SF113	7092
MANAGER, SYSTEMS		
Rein Mikkor	SF113	5058
SYSTEM HARDWARE SUPERVISOR		
Eugene Siciunas	SF113	4967
MANAGER, 7094 SERVICES		
Joyce Walton	49 St.Geo	6875
Supervisor (7094)	NP1207	7094
MANAGER, COMPUTER RESEARCH FACILITY		
Dennis Smith	SF214B	4800
LAB CO-ORDINATOR (CRF)		
Krishna Patnaik	SF207	8858
CONTRACT PROGRAMMING		
Bill Greene	SF214C	2694
AUTHORIZATION CLERK		
Yvonne Bowen	SF139	8703

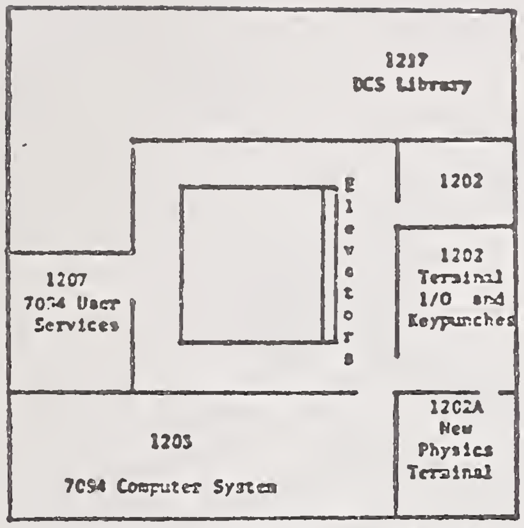
JOB AND SYSTEM STATUS QUERIES

SYSTEM/370, TSO	7373
ATS/APL	6234
7094	7094
2741 TERMINAL MALFUNCTIONS	7107
029 KEYPUNCH MALFUNCTIONS	6465

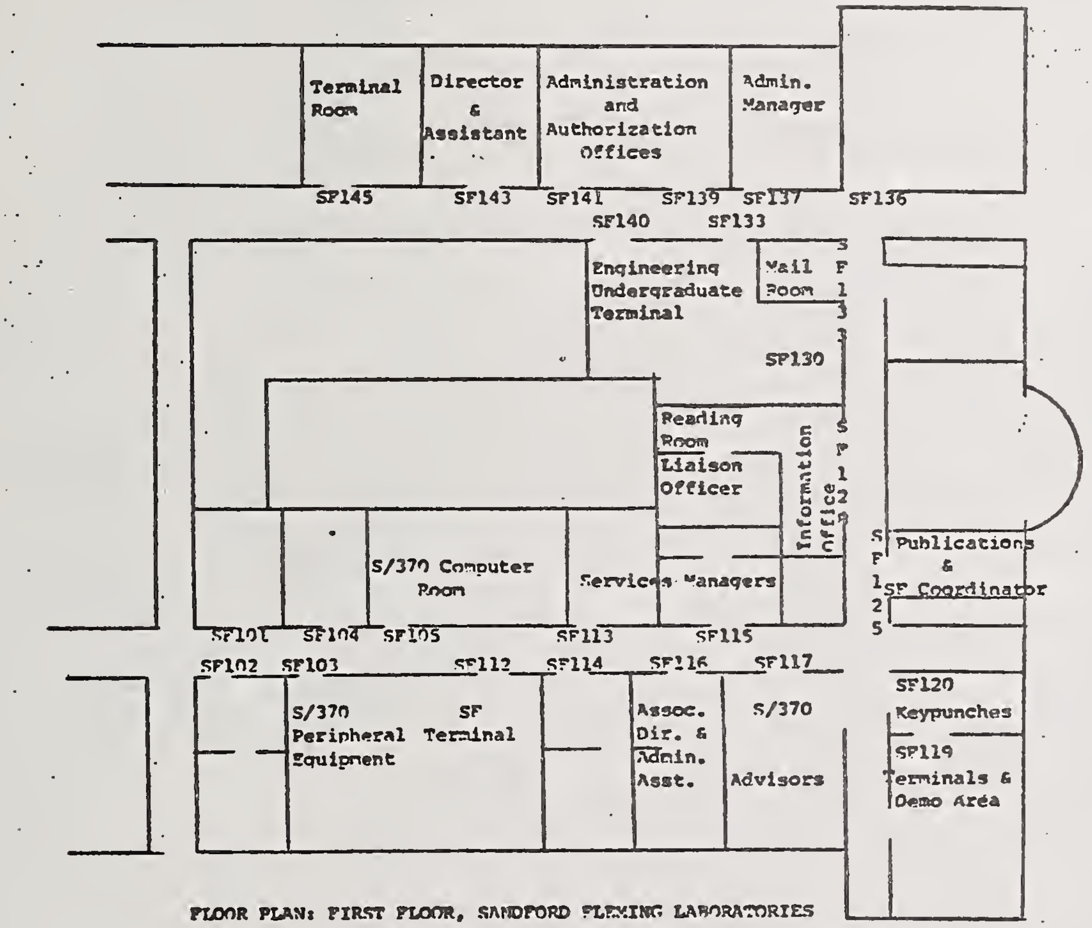
SERVICES

	DIAL-UP	ADVICE
APL	7200	6710
ATS	7100	7107
TSO - 2741	7303	8599
TSO - TTY (10 cps)	7390	8599
TSO - TTY (30 cps)	7386	8599
DATATALK	6710	6710

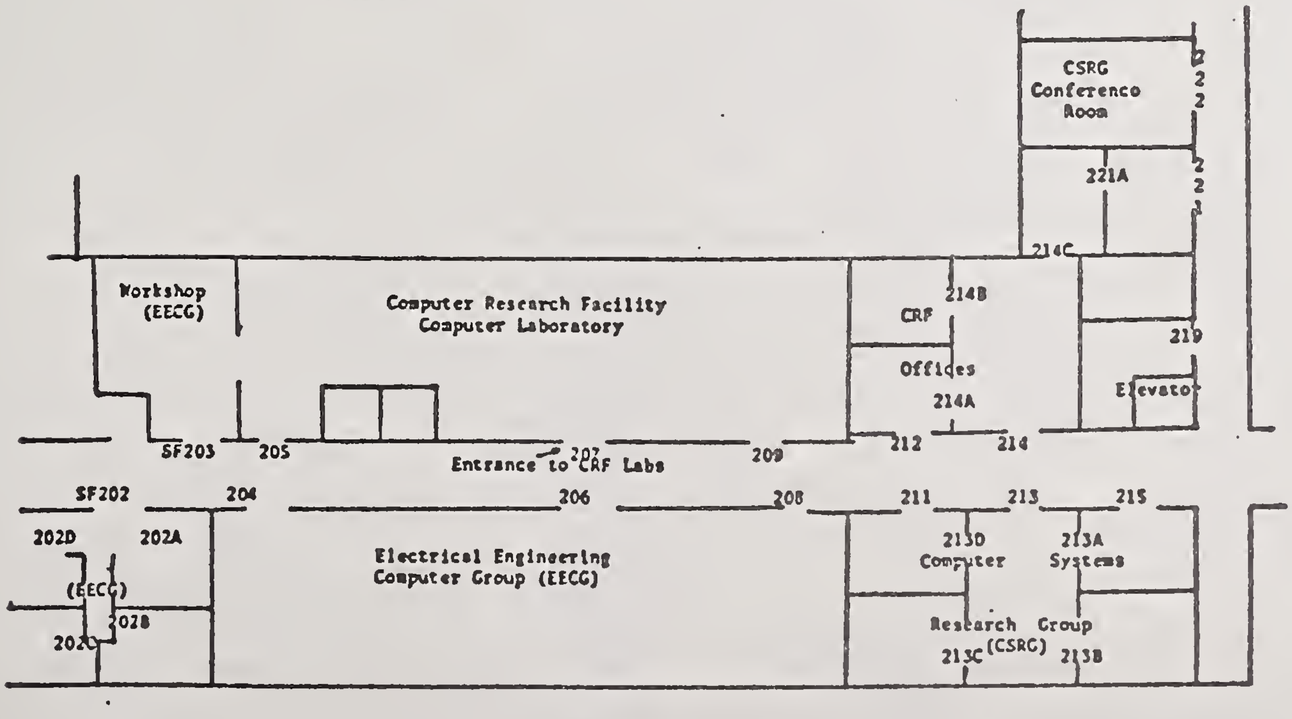




FLOOR PLAN: TWELFTH FLOOR, BURTON TOWER



FLOOR PLAN: FIRST FLOOR, SANDFORD FLEMING LABORATORIES



FLOOR PLAN: SECOND FLOOR, SANDFORD FLEMING LABORATORIES